

What is claimed:

1. An apparatus for combining a plurality of CATV channel signals at the head end of a CATV distribution system, comprising:

a first plurality of band-pass filters each having an input for receiving a separate, predetermined channel signal and an output, the output of the band-pass filters being directly connected to one another;

a second plurality of band-pass filters, each having an input for receiving a separate, predetermined channel signal and an output, the output of the band-pass filters being directly connected to one another; and

a combiner for combining the channel signals from said first plurality of band-pass filters with the channel signals from said second plurality of band-pass filters.

2. The apparatus of claim 1, wherein each of the band-pass filters within each of said first and second pluralities operates within a separate, predetermined frequency range and the frequency ranges are spaced from one another a sufficient amount to alleviate interference between any two band-pass filters within a single plurality.

3. The apparatus of claim 2, wherein one band-pass filter within said first plurality operates within the same frequency range as that of one band-pass filter within said second plurality.

4. The apparatus of claim 2, wherein each of said band-pass filters within said first plurality has a corresponding band-pass filter within said second plurality that operates within the same frequency range.

5. The apparatus of claim 2, wherein one band-pass filter within said first plurality operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters within said second plurality.

6. The apparatus of claim 2, wherein a plurality of band-pass filters within said first plurality operate within frequency ranges that are outside the operating frequency ranges of the band-pass filters within said second plurality.

7. The apparatus of claim 2, wherein said separate, predetermined frequency range has a bandwidth in a range of 20 MHz to 100 MHz, and the spacing between adjacent frequency ranges within a single plurality ranges from 20 MHz to 100 MHz.

8. The apparatus of claim 7, wherein said bandwidth is in a range of 30 MHz to 70 MHz and said spacing is in a range of 30 MHz to 70 MHz.

9. An apparatus for combining a plurality of CATV channel signals at the head end of a CATV distribution system, comprising:

at least one first module comprising a plurality of band-pass filters arranged on a substrate, each of said band-pass filters having an input for receiving a separate, predetermined channel signal and an output, said output of each of said band-pass filters being directly connected to one another at a common node, such that a single output of said first module comprises a combined signal comprising each filtered signal from each of said band-pass filters of said first module;

at least one second module comprising a plurality of band-pass filters arranged on a substrate, each of said band-pass filters having an input for receiving a separate, predetermined channel signal and an output, said output of said band-pass filters being directly connected to one another at a common node, such that a single output of said second module comprises a combined signal comprising each filtered signal from each of said band-pass filters of said second module;

at least one third module comprising a plurality of band-pass filters arranged on a substrate, each of said band-pass filters having an input for receiving a separate, predetermined channel signal and an output, said output of said band-pass filters being directly connected to one another at a common node, such that a single output of said

third module comprises a combined signal comprising each filtered signal from each of said band-pass filters of said third module; and

a combiner having at least one input corresponding to said output of each of said first, second and third modules and a single output, wherein said combiner combines the combined, filtered channel signals from said outputs of said first, second and said third modules into a combination signal at said single output.

10. The apparatus of claim 9, wherein said band-pass filters of each of said first, second and third modules operates within a separate, predetermined frequency range and said frequency ranges of said band-pass filters on any one of said first, second and third modules are spaced from one another a sufficient amount to alleviate interference between respective band-pass filters on said first module, said second module and said third module.

11. The apparatus of claim 10, wherein at least one band-pass filter of said first module operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters of said second module and said third module.

12. The apparatus of claim 10, wherein at least one band-pass filter of said second module operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters of said first module and said third module.

13. The apparatus of claim 10, wherein at least one band-pass filter of said third module operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters of said first module and said second module.

14. The apparatus of claim 10, wherein said separate, predetermined frequency range has a bandwidth in a range of 20 MHz to 100 MHz, and the spacing between

adjacent frequency ranges for said band-pass filters on each of said first module, said second module and said third module ranges from 20 MHz to 120 MHz.

15. The apparatus of claim 14, wherein said bandwidth is in a range of 30 MHz to 70 MHz and said spacing is in a range of 50 MHz to 120 MHz.

16. The apparatus of claim 10, comprising a sufficient number of said first modules such that each CATV channel that operates within said separate, predetermined frequency range for each of said band-pass filters of said first module is individually filtered through a separate first module;

a sufficient number of said second modules such that each CATV channel that operates within said separate, predetermined frequency range for each of said band-pass filters of said second module is individually filtered through a separate second module; and

a sufficient number of said third modules such that each CATV channel that operates within said separate, predetermined frequency range for each of said band-pass filters of said third module is individually filtered through a separate third module;

such that the combined signal from said output of said combiner includes all of the individually filtered CATV channel signals provided within the frequency ranges of each of said band-pass filters of each of said first, second and third modules.

17. The apparatus of claim 16, further comprising at least one housing, said housing containing said first modules, said second modules, said third modules and said combiner.

18. An apparatus for combining a plurality of CATV channel signals at the head end of a CATV distribution system, comprising:

a first module set comprising a plurality of first modules, each of said first modules comprising a plurality of band-pass filters arranged on a substrate, each of said band-pass filters having an input for receiving a separate, predetermined channel

signal and an output, said output of each of said band-pass filters being directly connected to one another at a common node, such that a single output of each of said first modules comprises a combined signal comprising a filtered signal from each of said band-pass filters for each of said first modules;

a second module set comprising a plurality of second modules, each of said second modules comprising a plurality of band-pass filters arranged on a substrate, each of said band-pass filters having an input for receiving a separate, predetermined channel signal and an output, said output of said band-pass filters being directly connected to one another at a common node, such that a single output of each of said second modules comprises a combined signal comprising a filtered signal from each of said band-pass filters for each of said second modules;

a third module set comprising a plurality of third modules, each of said third modules comprising a plurality of band-pass filters arranged on a substrate, each of said band-pass filters having an input for receiving a separate, predetermined channel signal and an output, said output of said band-pass filters being directly connected to one another at a common node, such that a single output of each of said third modules comprises a combined signal comprising a filtered signal from each of said band-pass filters for each of said third modules; and

at least one combiner having at least one input corresponding to said outputs of at least a portion of said plurality of first modules, said second modules and said third modules, said combiner having a single output;

wherein the combined, filtered channel signals from said first modules of said first module set, said second modules of said second module set and said third module of said third module set are input into said combiner and are further combined into a single combination signal at said output of said combiner with reduced insertion loss.

19. The apparatus of claim 18, wherein said band-pass filters of each of said first, second and third modules operates within a separate, predetermined frequency range and said frequency ranges of said band-pass filters on any one of said first, second and third modules are spaced from one another a sufficient amount to alleviate

interference between respective band-pass filters on said first module, said second module and said third module.

20. The apparatus of claim 19, wherein at least one band-pass filter of said first module operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters of said second module and said third module.

21. The apparatus of claim 19, wherein at least one band-pass filter of said second module operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters of said first module and said third module.

22. The apparatus of claim 19, wherein at least one band-pass filter of said third module operates within a frequency range that falls between the operating frequency ranges of two frequency-adjacent band-pass filters of said first module and said second module.

23. The apparatus of claim 19, wherein said separate, predetermined frequency range has a bandwidth in a range of 20 MHz to 100 MHz, and the spacing between adjacent frequency ranges for said band-pass filters on each of said first module, said second module and said third module ranges from 20 MHz to 120 MHz.

24. The apparatus of claim 23, wherein said bandwidth is in a range of 30 MHz to 70 MHz and said spacing is in a range of 50 MHz to 120 MHz.

25. The apparatus of claim 19, comprising a sufficient number of said first modules such that each CATV channel that operates within said separate, predetermined frequency range for each of said band-pass filters of said first module is individually filtered through a separate first module;

a sufficient number of said second modules such that each CATV channel that operates within said separate, predetermined frequency range for each of said band-pass filters of said second module is individually filtered through a separate second module; and

a sufficient number of said third modules such that each CATV channel that operates within said separate, predetermined frequency range for each of said band-pass filters of said third module is individually filtered through a separate third module;

such that the combined signal from said output of said combiner includes all of the individually filtered CATV channel signals provided within the frequency ranges of each of said band-pass filters of each of said first, second and third modules.

26. The apparatus of claim 25, further comprising at least one housing, said housing containing said first modules, said second modules, said third modules and said combiner.

27. A filter module, comprising:

a substrate; and

a plurality of band-pass filters arranged on said substrate, each of said band-pass filters extending from an individual input for receiving a separate, predetermined channel signal and converging at a common node, said individual inputs being spaced from one another and said common node comprising a single, common output for each of said filters of said module;

wherein each of said band-pass filters operates within a separate, predetermined frequency range and said frequency ranges are spaced from one another a sufficient amount to alleviate interference between said band-pass filters on said filter module.

28. The filter module of claim 27, wherein each of said band-pass filters comprise a plurality of discrete electronic components that are aligned to extend from a

respective one of said individual inputs toward said common node in a substantially linear manner.

29. The filter module of claim 28, wherein a first angle is defined by adjacent first and second band-pass filters, and a second angle defined by adjacent second and third band-pass filters.

30. The filter module of claim 29, wherein said first angle is substantially equal to said second angle.

31. The filter module of claim 27, wherein each of said band-pass filters operates within a separate, predetermined frequency range and the frequency ranges are spaced from one another a sufficient amount to alleviate interference between any two band-pass filters on said module.

32. The filter module of claim 31, wherein said separate, predetermined frequency range has a bandwidth in a range of 20 MHz to 100 MHz, and the spacing between adjacent frequency ranges for said band-pass filters on said module ranges from 20 MHz to 120 MHz.